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**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Art Unit: 1754

Application Number: 10/767,339

Filing Date: January 28, 2004

Appellant(s): ELWART ET AL.

John D. Russell

For Appellant

EXAMINER'S ANSWER

This is in response to the corrected appeal brief filed 10/22/08 appealing from the Office action mailed 12/15/05.

(1) Real Party in Interest

A statement identifying by name the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The statement of the status of claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Claimed Subject Matter

The summary of claimed subject matter contained in the brief is correct.

(6) Grounds of Rejection to be Reviewed on Appeal

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

(7) Claims Appendix

The copy of the appealed claims contained in the Appendix to the brief is correct.

(8) Evidence Relied Upon

6,419,890

LI

7-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

A. Claims 1-3, 5-7, 10, 12, 16-18, 21, 24-27, 29, 31-33, and 36-40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartley et al. US 6,482,377.

Regarding claims 1, 16, 21, and 31, Bartley '377 discloses a method for removing sulfur from an exhaust stream comprising directing the exhaust to a sulfur trap comprising metal oxide, adsorbing hydrogen sulfide (see column 5, lines 56-63) and reacting with a reducing agent (abstract).

Bartley '377 fails to disclose adjusting an air-fuel ratio based on exhaust temperature.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the air-fuel ratio to either rich or lean in the method of Bartley because Bartley discloses operation of the method for both lean and rich stoichiometries (see column 5, lines 44-46 and 56-58), which would obviously, to one of ordinary skill, suggest adjustment of the ratio to perform the method at the disclosed rich and lean stages.

Regarding claims 2, 10, 12, and 17-18, Bartley '377 discloses sulfur dioxide (see paragraph bridging columns 5-6) and nickel oxide (see column 5, lines 56-59).

Regarding claims 3, 5, 25-26, 29, and 32-33 Bartley '377 discloses forming the metal sulfide (see column 5, line 61) and sulfate (see column 6, lines 20-23).

Regarding claims 6-7, 24, 27, and 36-40, Bartley '377 discloses oxygen (see column 6, line 11) and running a rich or lean mixture (see column 5, lines 44-45 and 56-57), which can be "defined" in terms of time, cycles, or saturation.

B. Claims 4, 8-9, 11, 13-15, 19-20, 22-23, 28, 30, and 34-35, are rejected under 35 U.S.C. 103(a) as being unpatentable over Bartley '377 as applied to claims 1, 16, 21, and 31, above, and further in view of Li US 6,419,890.

Regarding claims 4, 19-20, 22, and 34, Bartley '377 fails to disclose hydrogen gas.

Li '890 discloses hydrogen gas (see column 8, lines 49-50).

It is considered that it would have been obvious to one of ordinary skill in the art at the time the invention was made to use the hydrogen of Li as the reducing agent in the sulfur removal method of Bartley because Li discloses the hydrogen as reducing agent for a process of sulfur reduction (see abstract).

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Regarding claims 8-9, 11, 13-15, 23, 28, 30, and 35, Li '890 discloses hydrogen gas (see column 8, lines 49-50), lean/rich operation at 625-750 degrees Celsius (see column 12, lines 21-26 and 43-49) and 200-400 degrees Celsius (see Fig. 1) and Bartley '377 discloses both rich and lean mixtures (see above).

(10) Response to Argument

It is argued that the standing rejection, however, contains nothing... transform the hydrogen sulfide. This is not persuasive because, contrary to Applicant's apparent assertion, the claim is broad enough to encompass changing the duration of the lean or rich operation without switching from lean to rich or rich to lean. Thus, so long as the ratio of the lean or rich operation is changed, the duration thereof is also changed, since no particular amount or direction of change based on temperature is claimed and any exhaust would have a temperature. Claims must be given their broadest reasonable interpretation. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997). The Office Action states that it would have been obvious to "adjust" the air-fuel ratio, which would by definition vary the duration of a lean or rich (the only two modes, other than perfect stoichiometry) operation once the adjustment were made and the ratio were changed to a different operation having its own duration.

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It is argued that first, it has to be stressed that the Examiner admits that Bartley fails to show adjusting an air-fuel ratio based on exhaust temperature. This is not persuasive because it would have been obvious to one of ordinary skill in the art at the time the invention was made to adjust the air-fuel ratio to either rich or lean in the method of Bartley because Bartley discloses operation of the method for both lean and rich stoichiometries (see column 5, lines 44-46 and 56-58), which would obviously, to one of ordinary skill, suggest adjustment of the ratio to perform the method at the disclosed rich and lean stages.

It is argued that second, even assuming Bartley et al. suggest adjustment... claimed elements are still missing. This is not persuasive because, contrary to Applicant's apparent assertion, the claim is broad enough to encompass changing the duration of the lean or rich operation without switching from lean to rich or rich to lean. Thus, so long as the ratio of the lean or rich operation is changed, the duration thereof is also changed, since no particular amount or direction of change based on temperature is claimed and any exhaust would have a temperature. Claims must be given their broadest reasonable interpretation. The Office Action states that it would have been obvious to "adjust" the air-fuel ratio, which would by

definition vary the duration of a lean or rich (the only two modes, other than perfect stoichiometry) operation once the adjustment were made and the ratio were changed to a different operation having its own duration. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

It is argued that thus, taking everything stated in the standing rejection as true... specific claimed elements. This is not persuasive because the claim encompasses a process wherein once the ratio is changed, a new operation begins with its own duration. Claims must be given their broadest reasonable interpretation. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

It is argued that upon close inspection, the above reasoning... lean and rich operation. This is not persuasive because, contrary to Applicant's apparent assertion, the claim is broad enough to encompass changing the duration of the lean or rich operation without switching from lean to rich or rich to lean. Thus, so long as the ratio of the lean or rich operation is changed, the duration thereof is also changed, since no particular amount or direction of change based on temperature is claimed and any exhaust would have a temperature. The Office Action states that it would have been obvious to "adjust" the air-fuel ratio, which would by definition vary the duration of a

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lean or rich (the only two modes, other than perfect stoichiometry) operation once the adjustment were made and the ratio were changed to a different operation having its own duration.

It is argued that furthermore, as the cited reference admittedly does not have... is obvious. This is not persuasive because so long as the ratio of the lean or rich operation is changed, the duration thereof is also changed, since no particular amount or direction of change based on temperature is claimed and any exhaust would have a temperature.

It is argued that furthermore, Applicants have reviewed Bartley et al. and find the term "temperature" mentioned only twice in the document. This is not persuasive because Applicant appears to admit that temperature is disclosed and, in any case, it would have been within the knowledge of an ordinary artisan that temperature involving exhaust emissions would vary to some extent and no particular amount or direction of change based on temperature is claimed. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

It is argued that applicants respectfully submit that the Office action has thus fallen victim... against its teacher. This is not persuasive because Applicant appears to admit that temperature is disclosed and, in any case, it would have been

within the knowledge of an ordinary artisan that temperature involving exhaust emissions would vary to some extent.

It is argued that applicants respectfully submit that not only has... supports the opposite conclusion. This is not persuasive because Bartley discloses operation of the method for both lean and rich stoichiometries (see column 5, lines 44-46 and 56-58), which would obviously, to one of ordinary skill, suggest adjustment of the ratio to perform the method at the disclosed rich and lean stages. It would have been within the knowledge of an ordinary artisan that temperature involving exhaust emissions would vary to some extent and no particular amount or direction of change based on temperature is claimed.

In re Morris, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997).

It is argued that unlike the cited art, the approach of claim 1... exhaust temperature varies. This repeated argument is again not persuasive for the repeated reason above.

It is argued that however, upon reviewing col. 5, line 61... nickel oxide catalyst. This is not persuasive because Applicant appears to admit that metal sulfide is reacted with oxygen -and- a sulfate is ultimately formed and also because Applicant does not claim a process wherein there is no intervening formation of sulfur dioxide. Rather, Applicant claims a process using open language, "comprising", which does not preclude formation of

sulfur dioxide, as Applicant appears to suggest. It is noted that the features upon which applicant relies (i.e., conversion of metal sulfide to sulfate without intervening conversion to "sulfur dioxide") are not recited in the rejected claim(s).

Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993).

Further, and in any case, Bartley '377 discloses forming the metal sulfide (see column 5, line 61) and sulfate (see column 6, lines 20-23). Applicant argues that the metal sulfide is not oxidized to sulfate because sulfur dioxide is formed. However, Bartley in fact discloses "diverting" sulfur dioxide in the exhaust gas and forming -a sulfate or sulfite species- (column 6, lines 3-23, specifically 20-23).

It is argued that rather, Bartley et al. shows both sulfides and sulfates in a different context. This is not persuasive because Applicant does not claim a process wherein there is no intervening formation of sulfur dioxide, as Applicant appears to suggest. It is noted that the features upon which applicant relies (i.e., conversion of metal sulfide to sulfate without intervening conversion to "sulfur dioxide") are not recited in the rejected claim(s). Although the claims are

interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, and in any case, Applicant argues that the metal sulfide is not oxidized to sulfate because sulfur dioxide is formed. However, Bartley in fact discloses "diverting" sulfur dioxide in the exhaust gas and forming -a sulfate or sulfite species- (column 6, lines 3-23, specifically 20-23).

It is argued that in other words, Bartley et al. discloses the reaction... sulfur dioxide, not a sulfate. This is not persuasive because Applicant does not claim a process wherein there is no intervening formation of sulfur dioxide, as Applicant appears to suggest. It is noted that the features upon which applicant relies (i.e., conversion of metal sulfide to sulfate without intervening conversion to "sulfur dioxide") are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). Further, and in any case, Applicant argues that the metal sulfide is not oxidized to sulfate because sulfur dioxide is formed. However, Bartley in fact discloses "diverting" sulfur dioxide in the

exhaust gas and forming -a sulfate or sulfite species- (column 6, lines 3-23, specifically 20-23).

It is argued that thus, the Office action appears to be referring to the mere mention of "sulfides" and "sulfates", without any... actually claim limitations. This is repeated argument is not persuasive for the reasons repeated above.

It is argued that claim 8, which depends from claim 5... 675 degrees Celsius. This is not persuasive because Li is not relied upon for a reaction of sulfides to sulfates, since Bartley '377 discloses forming the metal sulfide (see column 5, line 61) and sulfate (see column 6, lines 20-23). Li is relied upon for a disclosure of hydrogen and particular lean/rich operation temperatures. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is argued that claim 9, which depends from claim 5... 625 degrees Celsius. This is not persuasive because Li is not relied upon for a reaction of sulfides to sulfates, since Bartley '377 discloses forming the metal sulfide (see column 5, line 61) and sulfate (see column 6, lines 20-23). Li is relied upon for a disclosure of hydrogen and particular lean/rich operation

temperatures. One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is argued that however, upon reviewing the cited disclosure, Applicants find nothing... regenerate the nickel oxide. This is not persuasive because Bartley discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide, through the disclosed purging, and "reduce metal sulfates" (see abstract).

It is argued that further, Bartley et al. shows reducing metal sulfate with the reductant to form hydrogen sulfide, not sulfur dioxide, and not to regenerate nickel oxide (see steps 44 and 46 of Figure 3). This is not persuasive because Bartley discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide, through the disclosed purging, and "reduce metal sulfates" (see abstract).

It is argued that as such, upon a careful reading... disclosure fails to show that which is claimed. This is not persuasive because upon such careful reading of merely the abstract, Bartley discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide,

through the disclosed purging, and "reduce metal sulfates" (see abstract).

It is argued that claim 11, which includes the limitations of claim 10... is hydrogen gas. This is not persuasive because Li is relied upon for a disclosure of hydrogen and Bartley discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide, through the disclosed purging, and "reduce metal sulfates" (see abstract). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is argued that claim 13, which depends from claim 3... 400 degrees Celsius. This is not persuasive because Li is relied upon for the operation temperature and Bartley discloses exhaust gas and oxidizing to form -a sulfate or sulfite species- (column 6, lines 3-23, specifically 20-23). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is argued that the Office action relies primarily on Bartley et al... allegedly shown by Li. This is not persuasive for the reasons stated in the rejection.

It is argued that for example, claim 19 specifies an order of three operations... nickel oxide catalyst. This is not persuasive because Li is relied upon for a disclosure of hydrogen and Bartley discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide, through the disclosed purging, and "reduce metal sulfates" (see abstract). One cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

It is argued that thus, the rejection of claim 19... are shown or suggested. This is not persuasive for the reasons above.

It is argued that Applicants can find nothing in Bartley et al... perform the specified chemical formations and transportation. This is not persuasive because contrary to Applicant's apparent assertion, the claim is broad enough to encompass changing the duration of the lean or rich operation without switching from lean to rich or rich to lean. Thus, so

long as the ratio of the lean or rich operation is changed, the duration thereof is also changed, since no particular amount or direction of change based on temperature is claimed and any exhaust would have a temperature. Claims must be given their broadest reasonable interpretation. *In re Morris*, 127 F.3d 1048, 1054-55 (Fed. Cir. 1997). The Office Action states that it would have been obvious to "adjust" the air-fuel ratio, which would by definition vary the duration of a lean or rich (the only two modes, other than perfect stoichiometry) operation once the adjustment were made and the ratio were changed to a different operation having its own duration.

It is argued that claim 28 depends from claim 26... depends from claim 21. This is not persuasive because it fails to comply with 37 CFR 1.111(b), since it amounts to a general allegation that claim 28 defines a patentable invention without specifically pointing out how the language of claim 28 patentably distinguishes from the references.

It is argued that Applicants can find nothing in Bartley... exhaust temperature of the converter. This is not persuasive because Bartley discloses exhaust gas and oxidizing to form -a sulfate or sulfite species- (column 6, lines 3-23, specifically 20-23). Bartley further discloses introducing a reducing agent to "purge the trap", which would regenerate the nickel oxide,

through the disclosed purging, and "reduce metal sulfates" (see abstract).

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Edward M. Johnson/

Edward M. Johnson

Conferees:

/Stanley Silverman/

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EMJ